SEASONABLE HINTS

from the

DOMINION EXPERIMENTAL FARMS

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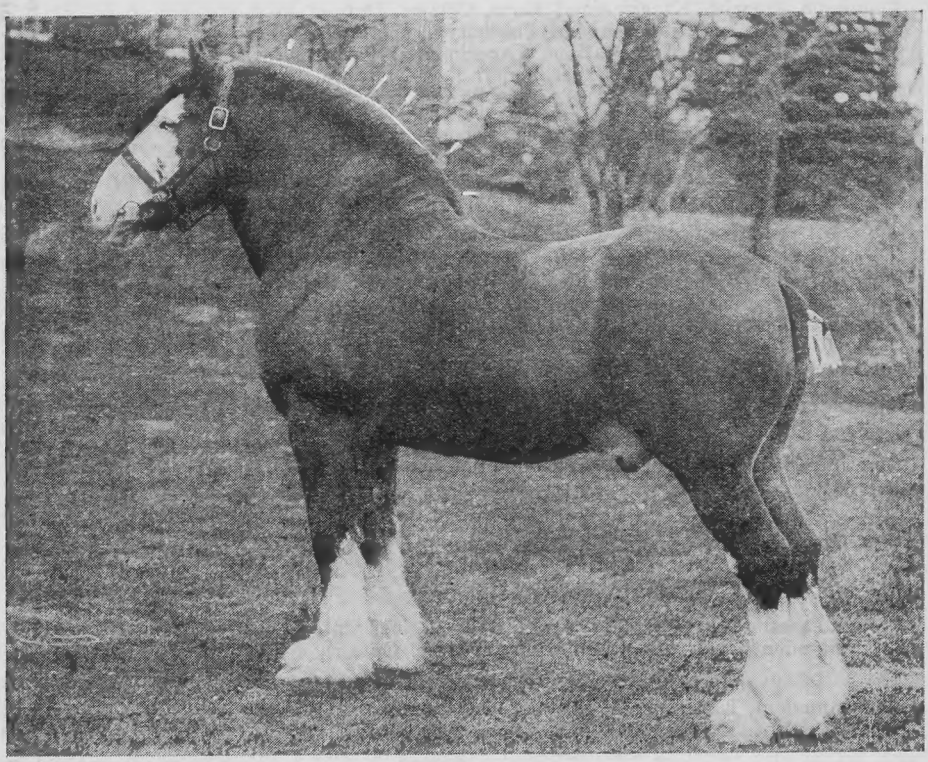

Sandy Mac (imp.) [24318] (20816) Clydesdale stallion at ten years

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Seasonable Hints

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SOME HEAVY HORSE BREEDING RESULTS

Many and varied have been the opinions expressed in recent years as to the relative economy of horses and tractors on the farm. It is not the intention of the writer to enter upon a discussion of this subject at this time but simply to make a few comparisons. As recently as the season of 1927-28, western oats were selling at middle west country points as high as sixty cents per bushel and Ontario oats at country loading points were bringing as high as seventy cents per bushel. This naturally meant high feeding costs for horses and consequently a strengthening of the argument in favour of tractors, a fact that tractor salesmen were not slow to make use of as many a farmer may realize to-day.

At the present time we have an entirely different set of conditions. Many farmers in the West have granaries filled with oats, the market value of which varies from five to ten cents per bushel at country points, i.e., not enough to pay the growing, threshing and hauling to elevator costs. Similarly in Ontario oats at country loading points are worth around twenty cents per bushel. At the same time, many of these same farmers are paying twenty-five to thirty cents a gallon for gasoline to run their tractors.

In view of the foregoing comparisons, the writer feels safe in predicting that the next few years will see a revival in the breeding and use of heavy draft horses on the farms of Canada, both East and West. Under present conditions, horses can be bred and reared cheaply and when they have reached working age, the charges for depreciation, fuel and repairs are surprisingly low, for the self-oiling engine has nothing whatever on the self-repairing heavy draft horse.

With the above-mentioned conditions in existence, the writer thought it might be timely to give a brief résumé of the progress of heavy horse breeding on the Central Experimental Farm, Ottawa, where tractors are made economical use of but where heavy horses can not be dispensed with. In March, 1916, two pure-bred imported Clydesdale mares were purchased. Each proved to be carrying a filly foal. This foundation was added to in 1919 by the purchase of another imported mare and also a Canadian bred mare. Three more Canadian bred mares were purchased in 1925.

Up to and including the breeding season of 1924, no stallion was kept at the Central Experimental Farm, the mares being either shipped out to be bred or being bred to some of the good horses standing in the district. In the fall of 1924, Sir James Calder presented the Dominion Government with the three-year-old Clydesdale stallion, "Sandy Mac" (imp.) [24318] (20816). This good young horse was kept at the Central Experimental Farm, Ottawa, for the following four breeding seasons and four excellent crops of foals were secured by him. A notable feature of the foals by this horse was that they were all very strong, healthy ones, while previously we had had considerable trouble with sickly foals, many dying of joint ill. It was just at this time that we commenced treating all in-foal mares with potassium iodide regularly during pregnancy. Whether it was the latter fact or the fact that "Sandy Mac" was kept in just good breeding

condition and allowed plenty of exercise daily in a paddock or yard that was responsible for the healthy foals is hard to say, but we certainly experienced very little trouble with sickness in his foals.

At the present time we have at the Central Experimental Farm fifty-six horses, including work horses, brood mares and foals, of which thirty-seven were raised on the Farm. Many of the others are old work horses, purchased previous to the start of the above described breeding program, that are due to be replaced by the good young horses we have coming along. Of the above thirty-seven home-raised animals, eighteen are by "Sandy Mac", and in addition a number of his progeny have been sold. Five of the younger animals are by the first son of "Sandy Mac" born on Canadian soil, namely, "Master Mac" (25300). In addition, "Sandy Mac" has sired quite a number of foals scattered throughout the Ottawa district. For the last three years he has stood for service at the Experimental Station, Lennoxville, Quebec, and is now being transferred to the Experimental Station, Fredericton, N.B., to head the Clydesdale stud being established there, and to be available, at a very nominal fee, for the use of the horse breeders in the district. His son, "Master Mac", has been shipped to the Experimental Station at Kapuskasing, Ont., and is standing at service there for the use of the settlers in the district.

The illustration on the cover will serve to show the type and quality of the horse "Sandy Mac". Incidentally, these results serve to show the value of a good breeding horse in building up a stableful of useful work horses and brood mares that can materially assist in cutting down farm production costs at any time, but more especially in these times of high-priced gasoline and low value grain crops.

Mention has already been made of the simple, outdoor life led by the stallions kept at this Farm and of the fact that the pregnant mares are given the potassium iodide treatment regularly. Other precautions taken are to see that the brood mares are well nourished on nutritious, well balanced but not too bulky foods. Winter and spring exercise is given by reserving for them all light hauling jobs. Experience has shown repeatedly that it is not a wise policy to put a brood mare to heavy hauling, particularly in heavy going. The colts and fillies are housed in either box stalls or tie stalls as available, but they spend the greater part of every fine day outdoors in yard or paddock on the south side of the buildings. Their rations consist of good, clean mixed hay, crushed oats and bran, and carrots, if available, in sufficient quantities to keep the animals in good growing condition. In order that good feed may not go for naught, all the horses except the in-foal mares are treated, usually about the first of December, for worms and bots, and it is surprising the numbers that are expelled and the improvement in condition of the animals as a result. In this connection, every horse raiser should get a copy of the recently issued bulletin of the Health of Animals Branch on the "Parasites of Horses", which gives information on methods of treatment.

GEO. W. MUIR,
Acting Dominion Animal Husbandman.

PROTEIN AND MINERAL SUPPLEMENTS FOR PIGS

Feeding tests conducted at the Dominion Experimental Station, Lacombe, Alberta, indicate that pigs placed on a ration made up entirely of meals from the cereal grains tend to become unthrifty and as a result make slow and comparatively expensive gains as compared with pigs fed rations that are properly supplemented. The cereal grains which form the basic ration for hogs are deficient in both protein and mineral matter. Protein is required for body growth, and mineral matter is needed for bone development and other vital purposes.

The addition of skim-milk or buttermilk to a cereal grain ration has been found to be the most satisfactory way of supplying the necessary elements for the growth of bone and body but when these dairy by-products are not available, or available in limited quantities only, various combined protein and mineral supplements, and mineral mixtures are effective in speeding up gains and cutting down the amount of grain required to produce a hundred pounds of pork.

An experiment was conducted at the Lacombe Station during the spring and summer of 1928 to obtain data relative to the value of protein and mineral supplements for growing pigs in dry lot. In order to verify results the experiment was repeated under identical conditions during the spring and summer of 1929 and 1931. A total of 156 pigs of Yorkshire, Tamworth and Berkshire breeding averaging fifty pounds in weight at the commencement of the test were used in the three experiments.

Six lots of pigs, with a total for the three years of twenty-six pigs in each, all self-fed the same basic ration, were used. During the first thirty days the meal mixture fed consisted of equal parts of oats, barley and shorts. At the end of the thirty-day feeding period the shorts were eliminated from the ration and the proportion of barley chop was gradually increased until towards the end of the feeding period the pigs were getting three parts of barley to one of oats. In addition, one group received buttermilk, another group tankage, a third group tankage and minerals, a fourth group minerals, a fifth group salt, and a sixth group received the meal ration without additions. Buttermilk was fed at the rate of 85 pounds per day, tankage at the rate of 8 per cent of the meal rations, and salt mixed with the grain at the rate of $2\frac{1}{2}$ pounds in 100 pounds of grain. The mineral mixture consisting of slacked coal 76 pounds; air-slacked lime 3 pounds; salt 20 pounds, and sulphur one pound was available at all times to the third and fourth groups from separate compartments of the self-feeders.

Based on the three year average, the results of this test in terms of dollars and cents, valuing oats at 43 cents a bushel, barley at 53 cents a bushel and shorts at $26 a ton show that while buttermilk cost 1·7 cents a gallon it had an actual value of 4·9 cents per gallon on the basis of grain saved, and tankage costing $2.35 per hundred pounds had an actual value of $6.63 per hundred pounds. The mineral mixture costing 36 cents per hundred pounds had an actual value of $1.79 on the basis of grain saved and salt costing $1.80 per hundred pounds, had an actual value of $16.51 per hundred pounds. The gains were made not only more economically but also more rapidly. Of the 45 pigs that were not up to 170 pounds at the close of the experiment, 19 or 42·2 per cent were from the lot fed no protein or mineral supplement.

In taking the average of two other tests with hogs on brome and oat-and-rye pasture the results show the margin of profit in feeding a protein or mineral supplement to be somewhat less. On the basis of grain saved buttermilk costing 2 cents a gallon had an actual value of 3·3 cents a gallon, tankage costing $2.55 per hundred pounds had an actual value of $2.87 per hundred pounds and salt costing $1.80 per hundred pounds had an actual value of $5.72 per hundred pounds. The mineral mixture costing 36 cents per hundred pounds had an actual value of 27 cents per hundred pounds, or was fed at a loss of 9 cents per hundred pounds. Oats were charged at 52·5 cents a bushel, barley at 67·5 cents a bushel and shorts at $34 a ton. Apparently good pasture crops assist in supplying the growth promoting food constituents but nevertheless will not entirely replace them.

H. E. WILSON,
Dominion Experimental Station,
Lacombe, Alberta.

THE SIGNIFICANCE OF DROUGHT RESISTANCE

Among the various crops commonly grown in Western Canada, sweet clover, alfalfa and some varieties of grass are able to survive periods of drought, while wheat and other grain crops are relatively non-resistant. Drought, in this discussion, is a period of dry weather during which vegetation suffers from a lack of moisture. Drought resistance from the farmer's point of view is the ability of crops to endure drought and produce satisfactory yields.

Experiments to study the reaction of various crops to drought have been made at the Dominion Experimental Station, Swift Current, Sask. The results of these experiments will be found in recent reports of the Dominion Field Husbandman, Central Experimental Farm, Ottawa, and in bulletin No. 130, Soil Moisture and Crop Production, copies of which can be secured free on request.

The ability of grasses and clovers to survive long periods of dry weather has sometimes resulted in the erroneous belief that these crops are particularly suited to drought areas. From the point of view of producing satisfactory yields, however, grass crops only partially meet requirements. While these crops and certain clovers can survive long periods of drought they are difficult to grow and give comparatively low yields of hay. On the other hand grain crops, although unable to survive a severe drought, are easily grown and yield more, when used as hay, than grasses or clovers under similar conditions.

The yields of crops on dry land areas is determined chiefly by the moisture supply. Where this is deficient and is all utilized by growing crops, the yields will vary according to the ability of the crops to use moisture efficiently. In this respect grain crops, used as hay, are superior to such crops as brome and western rye grass, sweet clover or alfalfa.

Experiments have shown that when wheat plants were subjected to drought the rate of growth was retarded as the available moisture supply diminished. As the process continued the heads of grain were formed prematurely. The plants were stunted and very little grain was produced. Applications of water to the soil at this stage failed to restore growth. Under very similar conditions, however, grass and clover crops, although severely wilted, quickly revived after water was applied. Wheat, therefore, is in no sense drought resistant. At the same time the possibility of one variety yielding more than another under dry conditions is worthy of investigation.

The testing of all new and promising varieties of wheat forms a regular part of the activities of the Dominion Experimental Farms. During dry seasons it is possible, therefore, to detect superior varieties as all are subject to the same conditions. At Swift Current a study is also being made of the amount of water used by some of the common varieties of wheat in producing an equal amount of grain. The results of these experiments have shown that all varieties give low yields during dry seasons although some yield slightly higher than the standard variety Marquis. The adoption of these varieties, however, is dependent upon a number of other considerations, the importance of which cannot be ignored.

Drought resistance, in Western Canada's most important crop, will be represented by a wheat producing the maximum amount of grain with a minimum consumption of moisture together with a short growing period. Under these conditions such a crop is in reality drought-escaping rather than drought resistant.

S. BARNES,
Dominion Experimental Station,
Swift Current, Sask.

FIELD BEANS

A decided increase in interest is being manifested in the growing of field beans in Western Canada. This is particularly true of the irrigated areas, and still more so of the irrigated areas where sugar beets are now being grown. The growing of field beans fits in very well with the growing of sugar beets. They should be seeded from the fifth to the fifteenth of May, depending upon the season, which is usually just after the seeding of sugar beets is completed, and the harvesting of them is done well in advance of that of the sugar beets. Both crops can be seeded and cultivated with the ordinary sugar beet drill and cultivator, special plates and gears being used for seeding beans.

Until beans are grown in sufficient quantities to warrant procuring special machines for pulling and threshing, such as are used in countries where beans are an important crop, it would be advisable to pull the crop by hand or improvise some suitable method, and equip ordinary threshing machines with special pulleys for threshing. Several machine companies supply equipment for their machines for the threshing of peas and beans, the main function of such equipment being to reduce the speed of the cylinder to about three hundred and fifty revolutions per minute and to maintain the ordinary speed of the other parts of the machine.

In past years practically all beans used in the cities and towns of Western Canada have been imported from Japan, United States or Ontario. If the cost of growing them, therefore, does not exceed the price which the wholesaler has to pay for them delivered from the above sources, and if the quality is sufficiently high, farmers should find a good home market for their product. Approximately six carloads of 30,000 pounds are used in Lethbridge annually.

It should be remembered that beans require a long season to mature. Every effort should, therefore, be made to have the crop reach maturity before the first fall frosts occur. Too rich land, too heavy irrigating, too thin seeding and too wide spacing of rows will all tend to prolong the period of growth. It should also be remembered that while some coloured varieties may ripen earlier than white varieties the market demand is for beans of the small white type. The Luther Burbank variety is the one of this type which has given most satisfaction at the Lethbridge Experimental Station, being the earliest and highest yielding of the small white type. In the past season it ripened in one hundred and two days and yielded thirty-five bushels per acre.

W. D. HAY,
Dominion Experimental Station,
Lethbridge, Alta.

GROW MORE ALFALFA

There are excellent arguments for a greater use of the alfalfa crop in Western Canada. At the present time there is a definite tendency to increase the acreage of forage crops. Alfalfa should certainly be grown on part of this land. It is true that the acreage of alfalfa remains small and many trials have resulted in disappointment. The reasons for this, however, are well understood. Alfalfa is a crop that requires special conditions and proper handling but it is a crop which will prove very valuable to the man who will try to understand how it should be grown.

There is always some danger of winter-killing in alfalfa but this is seldom due to lack of hardiness provided Canadian grown seed of the Grimm variety is used. A few years ago such seed was scarce and high in price. This is no longer true. Western Canada produces more than enough genuine Grimm seed for its own requirements and never before has the price been so reasonable. The

low cost of seed this year is a very good reason why greater use should be made of this crop. Ten pounds is sufficient to sow an acre and the crop should produce for at least five years without reseeding.

Winter-killing may be due, also, to improper management of the crop. This is the most common cause. Like many other plants, alfalfa stores up a reserve of plant food in the roots, this being necessary to support life during the winter. Before this reserve can be put away the nutrients must be taken from the soil in solution, transferred to the leaves, and converted into a new form suitable for storage in the roots. This is not possible without a substantial top growth. If alfalfa is cut too late in the season the existing root reserves are used up by the new growth which takes place, but there is not sufficient time, and often insufficient moisture in the fall, to make enough regrowth to replenish the roots. This condition frequently results in loss of plants by winter-killing especially during winters which are exceptionally long and cold.

Winter-killing due to improper management of the crop can be prevented by avoiding late cutting. During the first season the crop should not be cut at all. If it is very weedy it may be advisable to go over the field with a mower and cut off the weeds to prevent them from maturing seed, in which case the clipping should be done early in the fall and with the cutter bar of the mower set high. In succeeding years the crop may be cut for hay once or twice according to circumstances, but if a second cutting is taken it should be made quite early in the season so that there will be sufficient time for a strong fall growth.

There is much to be said for the plan of taking only one crop of hay per year. This requires much less work and, on the average, gives about three-quarters as much hay as two cuttings. It is also the best practical insurance against winter-killing and invariably results in a better crop the following year. In the drier parts of the West only one cutting of hay is practicable but when moisture conditions are very favourable, two cuttings are almost a necessity. We may say then that two crops of alfalfa can be taken in one season when a good second crop follows the first in quick succession but, generally speaking, one cutting should be the rule.

Alfalfa will grow on nearly all soils in the Prairie Provinces but it will pay to carefully select good soil for this crop. Alfalfa prefers good soil both because it responds to high fertility and because it retains moisture well. Sweet clover may be used to advantage on all sorts of soil types, and this makes it especially useful for soil improvement. Alfalfa, on the other hand, will yield most consistently on those parts of the farm that are known to be most productive.

The yield of alfalfa is apt to be light in dry years especially if there is little subsoil moisture. For this reason the crop is better suited to the park belt or bluffy part of the country than to the treeless plains because the latter has less available moisture. This does not mean that alfalfa will not grow under dry conditions. On the contrary it is a very drought resistant crop, by which we mean that it can withstand severe drought without injury. When the rains come again the alfalfa will quickly respond. Nevertheless the crop requires a lot of water for high yields which is the chief reason that it produces much the best in those areas that suffer least from drought.

On the average alfalfa may be expected to yield 1½ tons of cured hay per acre from one cutting. In good years two tons is not uncommon, and in very favourable seasons, when the crop produces two cuttings, the yield may easily reach 3 or 4 tons per acre.

One more factor in the successful growing of alfalfa must be emphasized, namely, the need for a good seed-bed. The field should be well prepared and the surface soil reasonably fine and firm, with some reserve of moisture. The kind of preparation which most nearly meets these requirements is a good summer-fallow. It is very questionable whether alfalfa seed should be sown

on anything else but summer-fallow. Shallow drilling of the seed is safer and better than broadcasting and no nurse crop should be used unless absolutely necessary to protect the plants when there is danger of soil drifting. If a nurse crop is used it should be a light seeding of grain and cut early for green feed.

L. E. KIRK,
Dominion Agrostologist.

VARIOUS CULTURAL PRACTICES FOR SWEET CLOVER

In recent dry years farmers in many sections of Prairie Canada have had difficulty obtaining stands of sweet clover. On the other hand where clover has made a stand and has been utilized for hay or pasture, grain following it has been so disappointing that numerous farmers have abandoned sweet clover for a time at least. The blame has in many instances been attached to the clover when in reality the fault lies in the cultural methods accorded it.

On fourteen Dominion Illustration Stations in Manitoba sweet clover has been seeded and grown under various methods. It is always seeded with a nurse crop of grain but preparation of the seed-bed may be bare fallow, corn land or stubble land which has either been fall or spring ploughed. Nurse crops used are wheat on fallow land and oats or barley on stubble ploughed land. On some Stations the seed is broadcast and harrowed in. On others, it is seeded through the drill with the grain. When seeded with wheat on bare fallow or corn land the clover seldom fails. In the extremely dry season of 1931 all fields seeded in this manner established a good catch of clover excepting at Deloraine, and Ste. Rose, where severe soil drifting accompanied the drouth. However, on six Stations where seeding was done with oats and barley on stubble ploughed land, fifty per cent of fields only, made successful catches and these were in the northern and eastern sections where moisture was more abundant.

During the last five years the best stands of sweet clover on Illustration Stations in Manitoba have been obtained when the seed was carefully inoculated, then mixed with the grain to be used as a nurse crop and seeded through the drill into a firm summer-fallow seed-bed to a depth not exceeding two inches. On stubble ploughed land early seeding has had an advantage over seeding late in May or early June because at this late date the seed-bed is usually drier and less firm.

On Stations where clover is seeded both on fallow and on second or third crop land equally good stands often appear at the end of the first season. After winter, however, that seeded on stubble ploughed land has frequently disappeared while that seeded with wheat on fallow seldom if ever kills out. The reason for this is that the drier and more open soil of stubble land does not develop the roots of clover seedlings sufficiently to carry them through the winter. On such fields roots are usually shallow and can readily be pulled up. When the majority of seedlings in a field show this condition in October the promise of a good crop, should the winter be severe, is not bright.

To ensure good crops of grain following sweet clover the fields on the Illustration Stations in this province are ploughed and worked down immediately the hay is removed. Whether hay is taken or the field is pastured, ploughing of the sod should be completed before the end of July. If this principle is adhered to, satisfactory grain crops can be grown after the clover, even in dry years. An outstanding example was that at Ste. Rose, Manitoba, in 1931. At this Station on very light soil wheat on bare fallow drifted severely and was not worth cutting while wheat after sweet clover hay did not drift, and yielded 20 bushels per acre. The average from all Manitoba Stations in 1931 showed wheat after clover yielding favourably with wheat on fallow.

Undoubtedly, more success would attend the growing of sweet clover on prairie farms in dry years if the following rules were carefully observed:—

(1) So arrange the grain rotation that the clover can be seeded with a nurse crop on summer-fallow land.

(2) Following the removal of clover for hay or subsequent to its use as pasture, the field should be ploughed and cultivated down before the end of July. Grain crop failures are common on clover land where the seed is not ploughed until fall, or even the following spring.

D. A. BROWN,
Dominion Experimental Farm, Brandon, Man.

SEED AND SEEDLING DISEASES OF BARLEY

About a century and a half ago, an investigator proved that seeds of plants carried diseases of different kinds in various ways. Since that time, men who were interested in the production of healthy plants have studied seeds, particularly those of agricultural plants, and they have stated that disease-infested seed is one of the means of carrying over from year to year many of our worst plant diseases.

The seeds of barley are no exception since they are known to carry several diseases which are transmitted to the plants which grow from them. The stripe disease, which kills the leaves and causes shrivelling and discoloration of the heads and seeds, is seed-borne. Clean seed from disease-free fields should be sown. Soaking the seed for one hour in a 0·3 per cent solution of semesan is a protective measure. Loose smut is also transmitted by the seeds of barley. The disease lies dormant in the seeds all winter and attacks the seedlings in the spring, finally resulting in smutted heads. The hot water treatment as prescribed for wheat will control this disease. The fungi which cause one type of root-rot of barley are carried by the seeds. The effect of those fungi on the resulting seedlings is not the only consideration; the diseased seeds serve to spread the disease in the soil. Clean seed is less likely to carry those fungi than seed of poor quality.

Discoloration of barley seeds may be caused to some extent by weathering, but investigations have shown that discoloured seeds such as brown, bronze, pink and green carry more disease organisms than do the bright healthy seeds. Shrunken seeds are under-developed and germinate poorly. Cracked seeds such as those injured during threshing permit the entrance of soil fungi into the seeds resulting in injury to the seedlings. The light and broken seeds may be separated by screening and fanning, but discoloured seeds are likely to remain. For that reason, only bright, clean seed should be used.

Diseased barley may prove toxic to farm animals. Some American feeding barley which was imported by Great Britain in 1930, and which was later found to be carrying a fungous disease known as scab, was poisonous to hogs. Some breweries have experienced difficulty with barley of a poor colour when it was placed on the malting floor. It went mouldy and the effect of the moulds was to lower its germinative capacity and to give an uneven growth. Thus purchasers of barley for feeding or malting purposes should obtain it from disease free areas.

During the seedling stage, barley may be attacked by the fungi which cause root-rots of wheat. The root-rot disease, Take-all, which at times is severe on wheat, will also attack barley, especially if the barley is sown on a field which produced, during the previous year, a crop of wheat which was attacked by the take-all fungus. Barley, in general, is more resistant to the disease than wheat, and there is evidence to show that there are differences in the resistance of different varieties to the disease. An attack by the take-all fungus results in stunting and a reduction of the number of tillers, rather than the death of the seedlings. Barley appears to carry take-all over to the following crop. Wheat sown after barley, on land that is known to be infected with the take-all fungus, is very likely to be injured by this parasite.

The root-rot disease known as "browning" in wheat attacks barley also, although no serious damage to the latter has been reported to date. Barley sown on summer-fallow after wheat which was injured by the "browning" disease is likely to be affected by that disease. The "browning" disease of wheat causes a dying off of the outer leaves of the seedlings and the number of tillers which the plant produces is usually one. Some farmers are of the opinion that the application of well-rotted manure to land known to be harbouring the disease will assist the plants in their fight against it.

A third type of root-rot, known as the *Helminthosporium-Fusarium* type is common in barley fields. The fungi associated with this root-rot attack the roots and basal parts of the stems producing dark brown lesions. A severe infection results in the stunting of the plants and a reduction of the number of tillers on each plant. This root-rot is found especially in crops of wheat or barley grown on land that is in a run-down condition. The addition of barnyard manure or commercial fertilizer of some sort may increase the vigour of the seedlings and may assist them in recovering from an attack by this root-rot.

Further information may be had on application to the Dominion Laboratories of Plant Pathology at Winnipeg, Saskatoon or Edmonton.

H. W. MEAD,
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Saskatoon, Sask.

TRANSPLANTING A TREE

The less a tree is disturbed the better growth it makes and transplanting, no matter how carefully done, causes a shock. This can be modified by the amount of roots lifted, by the amount of earth left on the roots, by the time required to do the transplanting and by the care and thoroughness of planting. The more roots lifted without injury and the more earth lifted with them the better chance the tree has to live. This is not so important with deciduous trees as with conifers because in case of conifers if the roots are exposed long enough to allow the surface to become the least bit dry there is no hope for the tree. The only safe way to transplant conifers is to lift the soil with the roots. The splendid stands of Spruce at the Rosthern Experimental Station were transplanted from the forest reserve north of Duck Lake in 1912, but the weight of earth transplanted was much greater than the weight of the trees. A deciduous tree is quite safe if it is lifted free of earth and the roots kept covered with wet sacks or wet moss or wet straw till it is planted. The tops of deciduous trees should be pruned back to about the same proportion as the root system has been cut in lifting. The shorter the time between lifting and planting the better chance the tree has.

In planting the tree dig a hole deep enough and large enough to hold the roots without cramping them and shake some top soil into the bottom of the hole and place the tree so that when planted it will be about an inch deeper than before it was lifted. Shovel the soil loosely over and around the roots and at the same time keep shaking the tree so as to insure the soil filling all the spaces about the roots and when the roots are covered tramp. By tramping is not meant gently tapping with the toe. It means standing with back to the tree and knee straight and then coming down with the full weight of the body on the heel and repeating this all around the tree. Add earth and continue tramping till the hole is nearly filled and then fill with water. When the water is absorbed fill with loose earth and consider the planting finished.

W. A. MUNRO,
Superintendent, Dominion Experimental Station,
Rosthern, Sask.

PILCHARD OIL AS A SUPPLEMENTARY FEED FOR YOUNG CHICKS

It is a fact, many times demonstrated, that cod liver oil of good quality will prevent rickets in chicks and permit of normal bone development even when substances containing the essential vitamine D are otherwise lacking in the ration. In designating an oil as of " good quality " it is presupposed that its vitamine content is approximately normal for the grade which it represents.

Owing to its low cost, Pilchard oil, made from a species of fish caught in large numbers on the Pacific Coast of Canada and the United States, presents possibilities as a substitute for cod liver oil for the purposes mentioned above. It was therefore, deemed advisable to determine to what extent this oil might substitute for the higher priced cod liver oil in the prevention of rickets and the normal formation of bone in chicks.

A detailed experiment was carried out at the Poultry Division of the Central Experimental Farm, Ottawa, in which Pilchard oil was contrasted with cod liver oil, direct sunlight, sunlight through glass substitutes and ultra violet rays as produced by a mercury vapour lamp. Two grades of Pilchard oil were used, one of which represented " commercial run " oil as dipped from the vats of canneries upon the Pacific Coast and another of which was very carefully refined so as to maintain its native vitamine content as much as possible. These were fed at levels of 1 per cent and 2 per cent of the total ration and were incorported into the all mash ration fed at the commencement of the experiment. The cod liver oil used was a No. 2 Newfoundland poultry oil and had previously given satisfactory results. Since sunlight has been proven to synthesize vitamine D in the skin and has been proven to substitute successfully for vitamine D containing substances, a pen receiving direct sunlight, one receiving the essential ultra violet rays of the sun through the medium of a mercury vapour lamp and one receiving no sunlight or substitute as a control pen were included in the test. All the above agencies excepting Pilchard oil have previously been proven capable of sustaining normal bone development in chicks at this Division. The mash fed to all pens was as follows:—Wheat shorts, wheat middlings, yellow corn meal and ground oat groats,—22 per cent of each; meat meal 6 per cent; fish meal, bone meal and buttermilk powder—2 per cent of each. The oils used were added directly to this mixture.

At four weeks of age the chicks of the negative control pen (no sunlight) or substitute) showed symptoms of rickets and at the close of the test (six weeks) rickets was very advanced in this pen, definitely pointing out that the ration used when unsupplemented by vitamine D containing substances or by sunlight or its equivalent, ultra violet rays, did not contain sufficient of vitamine D to prevent a rachitic condition. The percentage of ash in the bones of chicks as determined by chemical analysis is a good indication of bone condition and amounted to 9·88 per cent for this pen as against an average of 16·7 per cent for the other pens under consideration. Growth was also very inferior in this pen. No significant difference could be measured between the other pens mentioned either as to growth or ash content of bones. Hence it is concluded that each of the agencies mentioned is equally efficient.

It may be concluded, then, that Pilchard oil if of similar quality to that used herein, is equally as efficient as poultry cod liver oil in supplying vitamine D when used with a normal good chick ration. If biologically-tested Pilchard oil is available it may of course be substituted for cod liver oil with greater safety. Good grades of cod liver oil vary from 90 cents to $1.30 per gallon or upwards in price according to quality and quantity purchased. Commercial run Pilchard oil during the year 1930 cost approximately 30 cents per gallon on the Pacific Coast. It can easily be appreciated that a worthwhile economy may be attained by feeding the lower priced oil.

Since cod liver oil is a good source of the growth producing vitamine A, a vitamine essential to the welfare of growing animals, a test is at present under way to determine the comparative values of the two oils from this stand-

point. The experiment has progressed sufficiently far at the present time to demonstrate that Pilchard oil is at least as potent from the vitamine A standpoint as the cod liver oil used if not more so. Work done to date would also indicate that commercial run Pilchard oil is approximately 2½ times lower in free fatty acids than poultry cod liver oil as used in these tests, a factor which is in favour of the former oil.

H. S. GUTTERIDGE,
Central Experimental Farm, Ottawa.

SPRING WORK AND ITS RELATION TO THE HONEY CROP

The honey crop is the final result of a year of effort on the part of the beekeeper and is usually a reliable index of the efficiency of that effort. No sooner is the honey crop of one year harvested than preparations for the crop of the following year must be commenced. As spring management is only one phase of the year's work and the nature of it largely dependent upon the work that has preceded it, a brief review of what has gone before is perhaps advisable.

The amount of honey which a colony can gather is largely dependent upon the number of bees that colony can release for field work during the period of the honey flow and upon the ability of the beekeeper to keep this force contentedly working. The total number of bees within the colony is not a reliable index as to its ability to gather honey, because it is only those bees that are above a definite age that are effective as nectar gatherers and it is the number of bees in this force that counts in the production of surplus honey and furthermore, the strength of this force is dependent upon the care given the colony during the previous eleven months and not upon spring management alone as so many beekeepers fondly hope.

The Canadian winter is usually long and severe upon bee life, and weak colonies or those not properly prepared have little chance of surviving it in such a condition that they become profitable producers the following summer. The first work of the beekeepers' year, then, is to make sure that each colony is headed by a prolific queen during the months of August and September so that a large force of young bees may be produced before cold weather sets in. At the same time it is necessary to supply the bees with sufficient food and space to take full care of this extra brood rearing. Bees do not hibernate in the true sense of the word, they require food during the winter months and they also need protection. An adequate supply of wholesome food to carry the bees through the winter and well on into the following spring should be given not later than the middle of October. At Ottawa we have found that the amount given should not be less than forty pounds to be safe. For protection bees may be placed in a cellar or in packing cases. If in the former, the construction of the cellar must be such that the temperature may be held uniform at about forty-five degrees Fahrenheit throughout the winter. If they are placed in cases, the colonies must be well packed with a good insulating material and the whole apiary further protected by good wind-breaks. After the bees are fed and protected they will need no further attention until the following spring, moreover, if the work so far has been thoroughly done, the work of the spring will be greatly reduced.

The spring is perhaps the most critical time in the life of the colony because at that time the strength of the colony is greatly reduced, the vitality of the bees low and the food supply usually running short, and furthermore, it is at this time that the greatest strain of brood rearing is placed upon the colony, for the bees that survived the winter must now proceed to rear the bees that are to gather the harvest. As soon as brood rearing commences in the spring the consumption of food rapidly increases and soon doubles and trebles that of the winter, this, however, causes no anxiety to the thorough beekeeper; he knows that his bees still have an abundant food supply and are well housed and need no attention from him.

Early in spring, when the weather becomes warm enough for the bees to fly, all entrances should be cleared of snow and dead bees to prevent death of the colonies through suffocation. When outdoor wintered bees are bringing in pollen, it is time to return the cellar wintered bees to their summer stands. On the first warm day when the bees are flying freely, briefly examine each colony to see that it is queenright and contains sufficient food. Each colony should contain from fifteen to twenty pounds of food and any that are short of this amount should be fed. Colonies that are queenless or contain drone producing or failing queens should be united with strong queenright colonies or be requeened immediately. Weak colonies should also be united to stronger ones as they seldom become producing colonies. No further attention is needed until just prior to the honey flow from dandelion and fruit bloom when the colonies should again be examined to see that the queen is functioning properly and that she has sufficient room for the normal expansion of the brood nest. As there is not yet enough supplies coming in from the early flowers for the maintenance of the colony the supply of food within the hive may also need attention; food is an important factor when heavy brood rearing is required. Colonies that wintered in single brood chambers should now be ready for the second chamber, and if the brood chamber is of a size less than the ten-framed Jumbo hive, add the second chamber without a queen excluder below it. If the flow from dandelion and fruit bloom promises to be a heavy one it may be necessary to add a third chamber for the storage of the surplus. The bees should not be allowed to store this early honey in the brood chamber, as it might lead to early swarming.

The object of all spring manipulations is to encourage brood production to its maximum and there are four factors necessary to secure it, and for which the beekeeper alone is responsible, (1) Each colony must be headed by a prolific queen, (2) there must be enough food within the hive to not only supply the bees themselves, but to feed the oncoming generation of bees. (3) Sufficient room for the normal expansion of the brood nest and for the storage of any surplus nectar and pollen which the early flowers may yield, and (4) ample protection from the cold and changeable weather of spring. If the above factors are carefully analysed, it will be noted that they are identically the same as advocated for the fall, and furthermore, 1 and 2 can largely be taken care of in the fall by making sure that the colonies going into winter quarters are headed with young queens and that the bees are well supplied with food. Number 3 can also be taken care of by wintering the bees in two chambers, and if the top chamber be well filled with honey, then the food question is also taken care of. It will also follow that bees well packed and protected from cold winds in the fall will also be well protected the following spring. Those wintered in cellars, however, will need some attention in this matter in the spring. Accidents, however, occur, queens may be lost or injured, the food supply may run low in some cases, therefore, the spring examinations outlined above are necessary in order to be sure that every colony will build up to maximum strength for the honey flow.

C. B. GOODERHAM,
Dominion Apiarist.

An excellent booklet on "Beautifying the Home Grounds of Canada" has recently been published jointly by the Canadian Horticultural Council and the Dominion Experimental Farms. This publication covers the subject in a most understandable manner, is profusely illustrated, and contains planting lists suitable for all parts of Canada. Single copies may be obtained for twenty-five cents, or it may be had in quantities of twenty-five or more copies at twenty cents per copy by remitting direct to the Canadian Horticultural Council, 114 Vittoria Street, Ottawa.

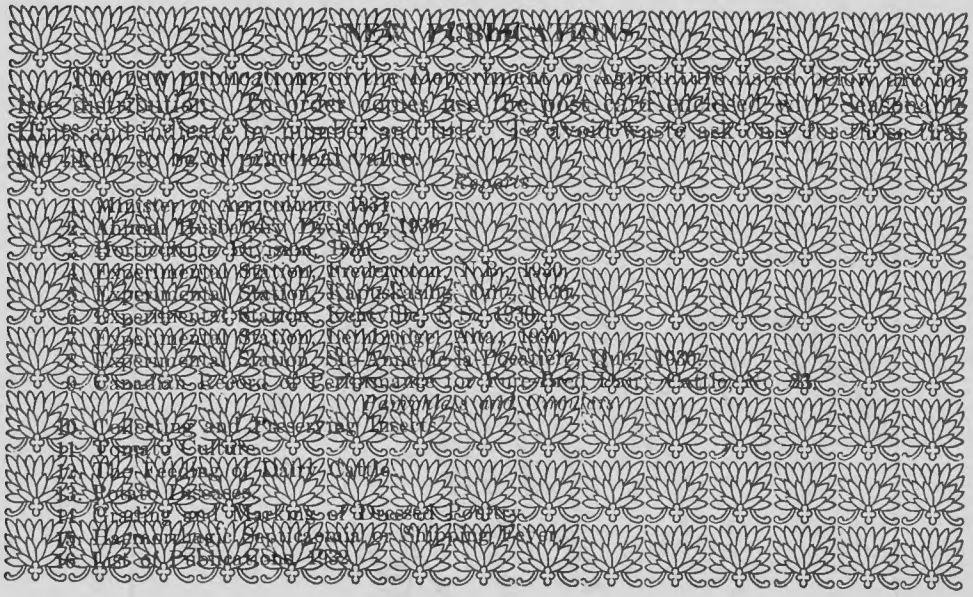
FARMER'S ACCOUNT BOOK

Farming is a business, and if it doesn't pay the farmer wants to know why it doesn't pay. Some record of receipts and expenses together with an inventory (a list with values of live stock, feed, implements, etc., on hand), taken at the beginning and end of the farmer's year, must be kept if he is to find out why or where it doesn't pay. A record of each department of the farm business should be kept. This is the only way to find out how much is being made from each or which departments are not paying.

In the spring when supplies of feed are usually lowest is a good time to take the inventory and commence keeping accounts.

To assist the farmer in this matter the Dominion Experimental Farms have issued a very simple and useful little account book. To keep accounts in this little book requires no special knowledge of accounting, simply the ability to write and add, and a record of transactions can often be made in less than one hour a week. This little book, while simple, is a great step in advance of keeping no accounts whatever. It may be procured from the Publications Branch, Department of Agriculture, Ottawa, for the small sum of ten cents. Now is a good time to take an inventory and start keeping accounts.

F. C. NUNNICK,
Chief, Division of Extension and Publicity,
Central Experimental Farm, Ottawa.



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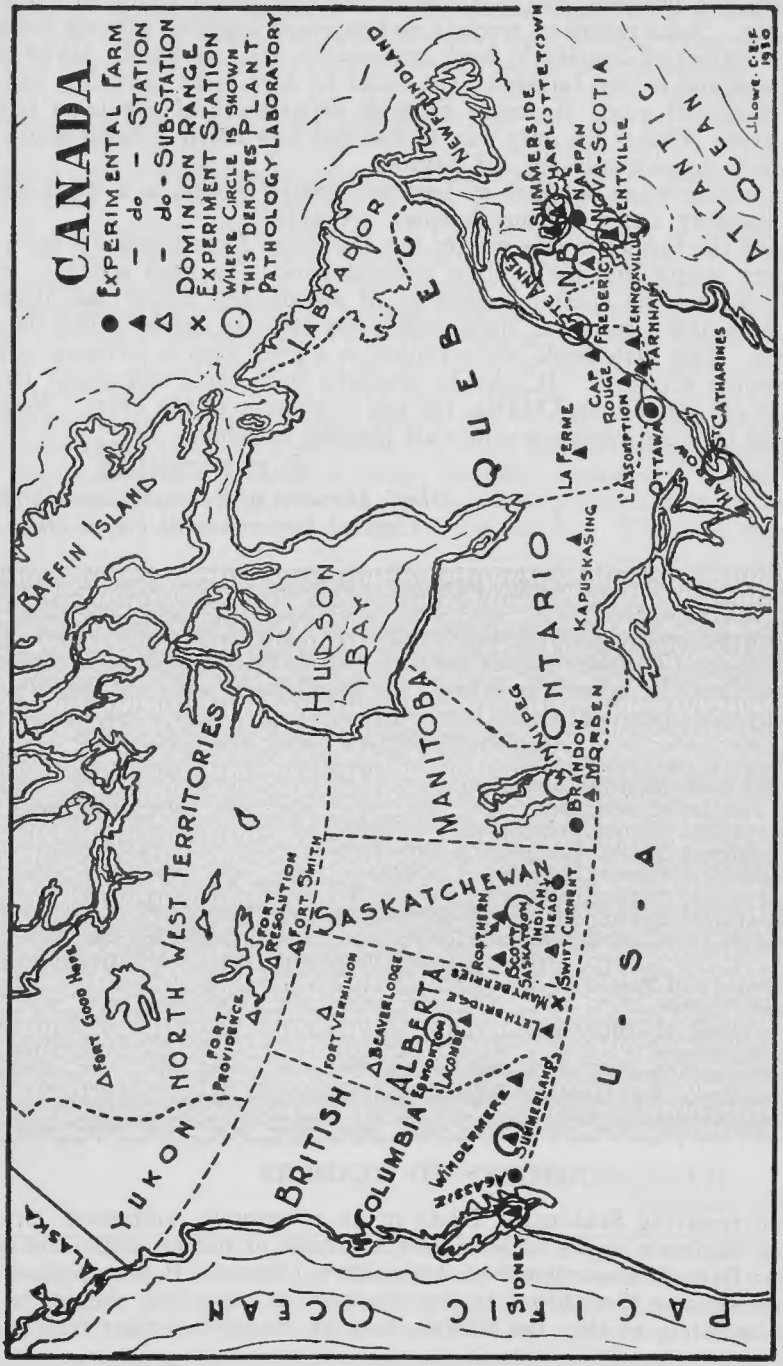

OUTLINE MAP OF CANADA SHOWING LOCATION OF DOMINION EXPERIMENTAL FARMS, STATIONS, AND LABORATORIES

Write to or, better still, visit your nearest Experimental Farm or Station when you are in need of information regarding live stock, pure seed or improved methods of farming.

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